INVENTORY DATABASE SYSTEM USING RADIO FREQUENCY IDENTIFICATION

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This report is submitted in partial fulfillment of the requirement for the award of Bachelor of Electronic Engineering (Computer Engineering) With Honours

Faculty of Electronic and Computer Engineering
Universiti Teknikal Malaysia Melaka

April 2009

UNIVERSTI TEKNIKAL MALAYSIA MELAKA
FAKULTI KEJURUTERAAN ELEKTRONIK DAN KEJURUTERAAN KOMPUTER

BORANG PENGESAHAN STATUS LAPORAN
PROJEK SARJANA MUDA II

Tajuk Projek	:	**INVENTORY DATABASE SYSTEM USING RFID**
Sesi Pengajian	:	**2008/2009**

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Supervisor's Name : Abd Shukur bin Jaafar

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To my beloved family

ACKNOWLEDGEMENT

By Allah blessing I was able to finish my final year project. Thus here I also like to express my token of appreciation to the people that have been supporting me until this project is successfully done.

Thanks to my supervisor En Abd Shukur bin Jaafar who always gives me brilliant ideas to improve the project and also to my family that supporting me until this project was finished.

Also, thanks to my friends in BENC who also had been helping me to make this project work.

Thank you,

ABSTRACT

Inventory database system using RFID is a database management system with RFID tag as a triggering input and as a security to the system. The idea is to develop a systematically database for lecturer to request stationary from office's faculty by enhancing it with the RFID and establish a Local Area Connection (LAN) connection. The aim for this project is to enable user to have an easy access for requesting stationary from faculty office's stationary. The RFID tag that has a unique identification number will be the input/password for user/administrator to access into the system. The Microsoft SQL Server 2005 will be used as a database that stored all the information and inventory related to this system. The interface for this system will be develop using Microsoft Visual Basic 6.0 and as the interaction between the hardware and software integration.

ABSTRAK

Projek ini merupakan sistem pengurusan pengkalan data yang melibatkan tag "Radio Frequency Identification" (RFID) sebagai pencetus masukan dan juga sebagai salah satu langkah keselamatan kepada sistem. Ideanya adalah untuk membina sebuah pengkalan data yang bersistematik untuk pensyarah membuat permohonan barang-barang dari stor fakulti dengan menggabungkan sistem ini bersama RFID dan membina sambungan "Local Area Connection" (LAN). Projek ini bertujuan untuk membolehkan pengguna sistem ini mengakses dengan mudah dalam permohonan barang-barang dari stor fakulti. Tag pada RFID mempunyai nombor pengenalan unik yang akan digunakan sebagai masukan/kata kunci kepada pengguna/pentadbiran untuk megakses pangkalan data. Perisian "Microsoft SQL Server" akan digunakan sebagai pangkalan data yang akan menyimpan segala maklumat dan inventori yang berkaitan dengan sistem ini. Pengantaramuka yang akan digunakan dalam sistem ini adalah perisian "Microsoft Visual Basic 6.0" di mana ia akan digunakan sebagai pengantara di antara perkakasan dan perisian.

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LIST OF ABBREVIATION

RFID   Radio Frequency Identification

DBMS   Database Management System

GUI   Graphical User Interface

USB   Universal Serial Bus

LAN   Local Area Network

RF   Radio Frequency

CW   Continuous Wave

LF   Low Frequency

HF   High Frequency

UHF   Ultra High Frequency

VHF   Very High Frequency

ISM   Industry, Scientific, Medical

RTF   Reader-Talks-First

TTF   Tag-Talks-First

RDBMS   Relational Database Management System

DBA   Database Administrator

RAD   Rapid Application Development

DAO   Data Access Object

ADO   ActiveX Data Object

CBSE   Component-Based Software Engineering

COTS   Commercial off-the-shelf systems

LIST OF APPENDIXES

CHAPTER 1

INTRODUCTION

1.1   Introduction

Inventory Database Management System Using Radio Frequency Identification (RFID) is a database management system (DBMS) applied with Radio Frequency Identification as trigger to access database. This system involves RFID, database, the server and client application and Graphical User Interface (GUI). A passive RFID tag used to transmit data to a reader of RFID in a contact less manner using radio waves. RFID reader then read the unique identification number from tag and established a communication with the database using USB serial port converter RS-232 serial connection. A user of the client computer then begins to send request information's form to administrator of server computer by the application Local Area Network (LAN). This system allowed two ways of communication; from client to server and vice-versa. The administrator upon receiving the request information will past a feedback to notify the user about the status of the requested items. Each of the information or data was stored in the database as an inventory.

1.2 Objectives

There are several objectives to be achieved for this project to be successfully built.

1. To enable user to have an easy access for requesting stationary from faculty office's stationary.

2. To develop an inventory database system using RFID with Microsoft Server Language as database and client-server application as the connection to faculty office's stationary.

3. To understand the basic function of RFID in order for user and administrator to begin using the system.

4. To learn and understand how to use programming language which involving Microsoft SQL and Microsoft Visual Basic 6 for database and GUI development.

1.3 Problem Statement

Although the faculty already have a system for requesting stationary, but it is not too efficient and systematic since it's involve the usage of form. Nowadays a system called Database Management System (DBMS) is common in an environment of an organization. A DBMS allow a systematically database to be built. In order to enhance the previous system, an RFID will be used as security precautions and a database will be built. The previous system needed lecturer to fill in form on the office's faculty which is located on the ground floor. Then the lecturer will wait for approval from PIC. There is no specific notification when the form will be processed by PIC either it is approved or rejected. Also there is a possibility that the form might lost in the process. By building this Inventory Database System using RFID, the problem stated above can be avoided.

1.4 Scope

This project will be focused on a certain area of development which stated in the scopes below:

1. Develop a communication between RFID and system.

2. Build a connection link between database and the interface.

3. Design GUI for both server and client using Microsoft Visual Basic 6.0.

4. Established a server-client network.

1.5 Methodology

Transmit radio signal

Reader to transmit to database for processing

Tag → RFID Reader → Host

Database

"Handshake"

Connect through rs232 to usb converter

User 1 — User 2 — User 3 — User 4

Request form----- ----------- -----------

To save in SQL database

SQL server

From admin

Request form----- ----------- -----------

Received Request

Process- Accept/Reject

SQL server
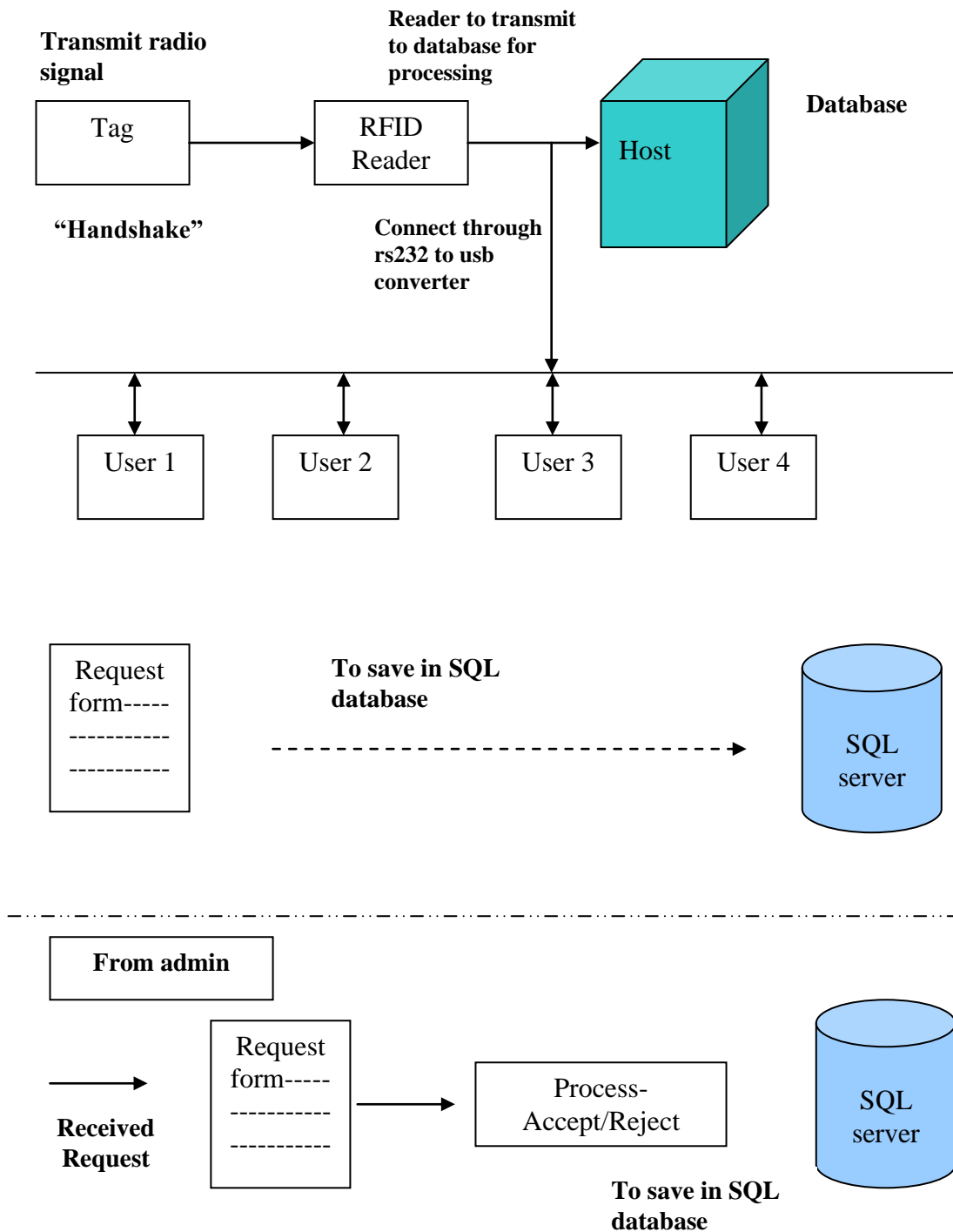
To save in SQL database

Figure 1.1: Block Diagram of Project

1.6   Report Structure

The first chapter of this report is about the introduction of the report. It includes an explanation about objectives, problem statement, scope and the methodology of the project.

The second chapter is about the literature view of the project. This chapter discusses about previous project that have been developed by others and their concepts..

The third chapter is an explanation about the methodology and process that taken to complete the project. It consist the detail development of GUI using Visual Basic 6.0 software process and the process to integrate RFID with the database and the interface.

The fourth chapter is the result obtain based on the methodology that used. The result will be analyzed based on the objectives and problem statement.

The fifth chapter is the discussion and summary of project achievement. It also includes the conclusion and recommendation that can be taken for future improvement of the project.

CHAPTER II

LITERATURE REVIEW

This chapter is discussing about theory and component used on the project. In this chapter, three main components will be focused on; Radio Frequency Identification, Database Management System and Microsoft Visual Basic

2.1   Radio Frequency Identification

RFID stands for Radio-Frequency Identification. It's a technology that uses radio waves to automatically identify physical objects. This device consist two main components which are "reader" and "tag". These components act as a transceiver and transmitter respectively or also known as transponder. There are various types of both components. Based on opinion of Dennis E. Brown [1]

> It is the name given to systems that put "tags" on objects (item bought and sold commercially, documents, people, animals, vehicles, containers, and so on) so they can be identified, tracked and managed automatically utilizing radio frequency equipment and supporting computer systems.

2.1.1   Fundamental Concept

Radio or radio frequency (RF) waves are electromagnetic waves with wavelengths between 0.1 cm and 1,000 km. Another equivalent definition in terms of frequency is radio waves are electromagnetic waves whose frequencies lie between 30 Hz and 300 GHz. Other electromagnetic wave types are infrared, visible light wave, ultraviolet, gamma-ray, x-ray, and cosmic-ray. RFID uses radio waves that are generally between the frequencies of 30 KHz and 5.8 GHz. A continuous wave (CW) is a radio wave with constant frequency and amplitude. From a communications vantage, a CW does not have any embedded information in it but can be modulated to transmit a signal. Modulation refers to the process of changing the characteristics of a radio wave to encode some information-bearing signal. Modulation can also refer to the result of applying the modulation process to a radio wave.

Radio waves can be affected by the material through which they propagate. A material is called RF-lucent or RF-friendly for a certain frequency if it lets radio waves at this frequency pass through it without any substantial loss of energy. A material is called RF-opaque if it blocks, reflects, and scatters RF waves. A material can allow the radio waves to propagate through it but with substantial loss of energy. These types of materials are referred to as RF-absorbent. The RF absorbent or RF-opaque property of a material is relative, because it depends on the frequency. That is, a material that is RF-opaque at a certain frequency could be RF-lucent at a different frequency. The RF properties of some example materials are provided in Table 2.1, following a discussion of RFID frequency types.